

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Bunker
Serial No.: 10/089,011
Confirmation #: 5289
Group Art Unit: 3683
Filed: March 25, 2002
Examiner: Siconolfi, Robert
For: METHOD AND APPARATUS FOR CONTROLLING A BRAKING
SYSTEM

APPEAL BRIEF

Dear Sir:

Please enter the following Appeal Brief in the appeal filed August 3, 2006.

REAL PARTY IN INTEREST

The real party in interest is Delphi Technologies, demonstrated by the assignment recorded on March 25, 2002, at Reel 012781, Frame 0604.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences to the present application.

STATUS OF CLAIMS

Claims 1 – 13 were cancelled during prosecution. Claims 14 and 17 – 20 stand rejected. Claims 15 and 16 are withdrawn.

STATUS OF AMENDMENTS

All amendments have been entered in the application.

SUMMARY OF CLAIMED SUBJECT MATTER

The invention recited in claim 14 provides a method of controlling a braking system of a road-going automobile. (Original Claim 1, Lines 1 – 2; Page 1, Lines 4 - 8; Element 10 in Figure 1.) The method includes the step of providing the vehicle with front and back

brakes in which the front brakes include a pair of rotatable wheel hubs. (Original Claim 1, Lines 23 – 25; Page 12, Lines 12 – 16; Element 46 in Figure 2.) The front brakes also include at least two spot-type brake discs mounted on each of the wheel hubs and supported for rotation with the wheel hubs and for axial sliding movement on the wheel hubs. (Original Claim 1, Lines 25 – 26 and Line 34 through Line 3 of Page 17; Page 13, Lines 15 – 16; Page 12, Line 34 through Page 13, Line 1; Page 10, Lines 30 – 31; Elements 54, 56 in Figure 2.) Each brake disc presents opposite circumferentially continuous annular braking surfaces. (Original Claim 1, Page 17, Lines 6 – 7; Page 13, Lines 2 – 6; Elements 60, 62 in Figure 2.) The front brakes also include at least three spot-type friction elements mounted on a stationary brake caliper associated with each wheel hub and interleaved with the associated brake discs. (Original Claim 1, Page 17, Lines 4 – 5 and Lines 8 – 10; Page 12, Lines 17 – 25; Page 13, Lines 8 – 10; Elements 64, 66, 68 in Figure 2.) The friction elements are circumferentially discontinuous so as to overly only an angular sector of the annular braking surfaces of the brake discs. (Page 12, Lines 28 – 32.) At least two of the friction elements are axially slidable on its respective brake caliper for engaging and disengaging the braking surfaces of the brake discs. (Original Claim 1, Page 17, Lines 17 – 18; Page 10, Lines 32 – 33; Page 13, Lines 22 – 29.)

The method also includes the step of providing a rotating electric actuator having a stator and a rotor. (Original Claim 1, Page 16, Lines 16 – 18; Original Claim 1, Page 17, Lines 22 – 28; Page 14, Lines 27 – 29; Elements 88, 90 in Figure 2.) The electric actuator is operative to move the friction elements into braking engagement with the brake discs. (Original Claim 1, Page 16, Lines 29 – 31; Page 14, Lines 19 – 22.)

The method also includes the step of controlling the attitude and movement of the brake discs with respect to the wheel hub and controlling the attitude and movement of the friction elements with respect to the caliper to maintain the brake discs and friction elements in parallel alignment during sliding movement into and out of braking engagement with one

another. (Original Claim 1, Page 17, Lines 11 – 17; Page 13, Lines 22 – 29; Elements 70, 72 in Figure 2.)

In an embodiment of the invention set forth in claim 17, the method is further defined wherein the rotating electric actuator includes a spindle and the method includes the step of actuating the spindle to move the friction elements into braking engagement with the brake discs. (Page 14, Lines 30 – 32; Element 92 in Figure 2.)

In an embodiment of the invention set forth in claim 18, the method is further defined wherein the spindle is threadedly engaged with the rotor and wherein the step of actuating the spindle is further defined as operating the electric actuator to rotate the rotor for moving the spindle axially relative to a rotational axis of the rotor. (Page 14, Line 27 through Page 15, Line 8.)

In an embodiment of the invention set forth in claim 19, the method is further defined wherein the rotating electric actuator is further defined as a servo motor and further including the step of operating the servo motor to rotate the rotor and move the spindle axially relative to a rotational axis the rotor. (Id.)

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Claims 14 and 17 – 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bunker (WO 98/26191) in view of Taig et al. (U.S. Pat. No. 4,804,073). This appeal requests review of the rejection as applied to claims 14 and 17 – 19.

ARGUMENT

1. The rejection fails for lack of a proper motivation to combine the references.

There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to combine reference teachings. M.P.E.P. § 2143. The Examiner proposes that "[i]t would have been obvious to one

of ordinary skill in the art at the time the invention was made to use an electric actuator with hydraulic back-up as taught by Taig in the system of Bunker in order to improve performance due to elimination of pressure delay while still maintaining safety even in the event of electrical failure." Office Action dated 04/11/2006, page 3, lines 17 – 21.

The shortcoming of the proposed motivation is that "pressure delay" is not a problem inherent in hydraulic braking systems relative to electric braking systems. In other words, any basis for pressure delay would exist in both hydraulic and electric brake systems. Hydraulic braking systems use incompressible fluids that transmit fluid pressure changes instantaneously and would therefore not exhibit any more delay than an electric system. The problem of pressure delay is certainly not identified in the prior art relied upon for the rejection. Taig et al. discloses that electric braking systems are desirable because of reduced weight and simplified components, not because hydraulic systems exhibit excessive delay compared with electric systems. Pressure delay is known to be an issue with pneumatic brake systems, as set forth in U.S. Pat. No. 5,892,437, but is not recognized as a shortcoming of hydraulic systems when compared to electric systems.

It is therefore submitted that the rejection fails since the proposed motivation is not in the references, nor is the proposed motivation in the knowledge generally available to one of ordinary skill in the art since the motivation is not based on an objectively accurate assertion about braking systems.

2. The rejection fails because the references teach away from one another.

It is improper to combine references where the references teach away from their combination. M.P.E.P. § 2145(X)(D)(2), citing *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). Taig et al. provides an express motivation for replacing hydraulic braking systems with electronic braking systems and this motivation teaches away from the combination. Taig et al. teaches that "[b]ecause of the increasing emphasis on reducing weight

of vehicles and simplifying components thereof, it is desirable to develop a braking system that is operated electronically." '073 patent, column 1, lines 11 – 15. Both Taig et al. and Bunker disclose a caliper housing having a bore. Taig et al. discloses caliper housing 14 with bore 16 and Bunker discloses support body 28 with cylinder 30. However, while Bunker discloses a single hydraulically-driven piston movable in the cylinder 30 to effectuate movement of the brake pads, Taig et al. discloses a motor 40; a motor housing 24; a bearing (unnumbered) supporting a rotor (unnumbered) of the motor 40; a sun gear 52; a planetary gear carrier 60 with parts 61 and 62; planetary gears 54, 56, 58; three pins 63; ring gears 70 and 80; a nut 90; screw means 88; and a piston 30 to effectuate movement of the brake pads. This complicated arrangement disclosed by Taig et al. is required at each wheel of the vehicle. On the other hand, a single source of hydraulic pressure could engage all of the brakes of the vehicle in the Bunker device.

One of ordinary skill in the art, motivated by Taig et al. to reduce weight and simplify components, would utterly reject the complicated arrangement for moving brake pads disclosed by Taig et al. and instead adopt the arrangement for moving brake pads disclosed by Bunker. As a result, the "combined" teachings of Bunker and Taig et al. would result in a fully hydraulic brake system, not an electric system as claimed in the present application.

CONCLUSION

For the reasons stated above, it is respectfully submitted that Appellant's invention as set forth in claim 14 and further defined in claims 17 – 19 patentably define over the cited references. As such, it is respectfully submitted that the Examiner's final rejection of claims 14 and 17 – 19 is erroneously based and its reversal is respectfully requested.

No oral hearing is requested.

The fee for filing the Appeal Brief was already paid on March 25, 2005. At that time, the appeal was not heard by the Board because prosecution was continued in the form of a

restriction requirement mailed on July 13, 2005. Applicants did not request refund of the appeal brief filing fee at that time and it is therefore submitted that payment for filing the appeal brief is not required at this time. However, if it is determined that payment is required, Appellants' attorney authorizes the Office to charge any fees owed to Deposit Account No. 04-1061 of Dickinson Wright, PLLC.

Respectfully submitted,

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CLAIMS APPENDIX

Claims 1-13 (Canceled).

14. (Previously presented) A method of controlling a braking system of a road-going automobile, comprising:

providing the vehicle with front and back brakes in which the front brakes include a pair of rotatable wheel hubs, at least two spot-type brake discs mounted on each of the wheel hubs and supported for rotation with the wheel hubs and for axial sliding movement on the wheel hubs and each brake disc presenting opposite circumferentially continuous annular braking surfaces, at least three spot-type friction elements mounted on a stationary brake caliper associated with each wheel hub and interleaved with the associated brake discs and being circumferentially discontinuous so as to overly only an angular sector of the annular braking surfaces of the brake discs, and with at least two of the friction elements being axially slidable on its respective brake caliper for engaging and disengaging the braking surfaces of the brake discs;

providing a rotating electric actuator having a stator and a rotor with the electric actuator operative to move the friction elements into braking engagement with the brake discs; and

controlling the attitude and movement of the brake discs with respect to the wheel hub and controlling the attitude and movement of the friction elements with respect to the caliper to maintain the brake discs and friction elements in parallel alignment during sliding movement into and out of braking engagement with one another.

15. (Withdrawn) A braking system of claim 16 wherein said rear brakes include a pair of rear wheel hubs and a single rear brake disc mounted on each of the rear wheel hubs and supported for rotation with the rear wheel hubs and for axial sliding movement on the rear wheel hubs and each rear brake disc presenting opposite circumferentially continuous annular rear braking surfaces at two spot-type rear friction elements mounted on a stationary rear brake

caliper associated with each rear wheel hub and straddling the associated rear brake discs and being circumferentially discontinuous so as to overly only an angular sector of the annular rear braking surfaces of the rear brake discs, and with at least one of the rear friction elements being axially slidable on its respective rear brake caliper for engaging and disengaging the braking surfaces of the rear brake discs.

16. (Withdrawn) A braking system for a road-going automobile having a set of front wheels to be braked and a set of rear wheels to be braked, said braking system comprising:

a pair of front brake discs associated with each front wheel mounted on a front wheel hub of each front wheel for rotation therewith and for sliding movement along the associated front wheel hub;

at least three front friction elements associated with each front disc brake mounted by a respective stationary front brake caliper in interleaved relation to the front brake discs;

only a single rear brake disc associated with each rear wheel mounted on a rear wheel hub of each rear wheel for rotation therewith and for sliding movement along the associated rear wheel hub;

at least two friction elements associated with each rear disc brake mounted by a respective stationary rear brake caliper in straddling relation to said rear brake discs; and

an actuator device operative to selectively move said friction elements and said disc brakes into and out of braking engagement with one another.

17. (Previously presented) A method according to claim 14 wherein the rotating electric actuator includes a spindle and further including the step of actuating the spindle to move the friction elements into braking engagement with the brake discs.

18. (Previously presented) A method according to claim 17 wherein the spindle is threadedly engaged with the rotor and wherein the step of actuating the spindle is further defined as operating the electric actuator to rotate the rotor for moving the spindle axially relative to a rotational axis of the rotor.

19. (Previously presented) A method according to claim 17 wherein the rotating electric actuator is further defined as a servo motor and further including the step of operating the servo motor to rotate the rotor and move the spindle axially relative to a rotational axis the rotor.

20. (Previously presented) A method according to claim 17 further providing a hydraulic mechanism fluidly coupled to the electric actuator and wherein the step of actuating the spindle is further defined as operating the hydraulic mechanism to supply hydraulic fluid under pressure to the electric actuator.

EVIDENCE APPENDIX

There is no evidence that supplements the prosecution history of this application.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings.